# Eco-distribution mapping of the priority medicinal plants of southern India

## D. K. Ved, Vijay Barve*, S. Noorunnisa Begum and R. Latha

Foundation for Revitalisation of Local Health Traditions, 50 MSH Layout, Anand Nagar, Bangalore 560 024, India

THE Indian subcontinent is one of the most distinct biogeographic regions of the world, with a rich repository of medicinal plant species. Over 7000 species of plants are used from the earliest times by various health care systems in the country. The traditional knowledge regarding these plants and their utilization is being increasingly realized and put to use by modern medicine. For the pharmaceutical industries, these plants form a major source of their raw material requirement. As a consequence of unregulated use of these plants, their populations are heading towards alarming depletion, coupled with fragmentation of their natural habitats. Human interference, destruction of medicinal plants during harvesting, trade in high quantities and harvesting for other uses such as timber and firewood is accelerating the pace of disappearance of many valuable plant species.

Understanding the natural distribution and eco-climatic limits of these taxa, helps in formulation of their conservation strategies[1]. With the help of data on distribution pattern and availability of the species, historic as well as current, the causes for its reduction in number and rarity can be diagnosed. Systematic mapping of the occurrence of the species also provides insight into the regions where the conservation has to be initiated; such maps offer information on the extent of protection required and how efficiently and effectively it could be carried out. In this paper we present the efforts at FRLHT towards mapping the distribution of certain prioritized medicinal plants in the three states of Karnataka, Kerala and Tamil Nadu of southern India[2]. The process started with prioritization of wild medicinal plants of southern India based on the data relating to the trade (volume, value and plant parts/products in trade), endemism and reported rarity, etc. A short list of around 300 such prioritized species was finalized and the data on them were gathered from the following three major sources.

## Literature study

Published floras pertaining to the region under study as well as floras of other regions of the country, research papers, atlas, etc., were used. Compilation has been done from these sources to tabulate district-level presence of each selected taxon and the information has been presented on maps. Whenever the information available in the literature is precise enough in terms of locations of collection of taxon the same has been converted into latitude, longitude co-ordinates to plot the distribution of the taxon on a digitized map of the region.

## Herbarium records

About 20,000 voucher specimen of prioritized medicinal plant species housed in more than 20 herbaria of the region were referred and data were compiled in a standardized format and computerized. The data recorded on voucher specimen sheets incorporate the location of collection site. The latitude and longitude co-ordinates of each location were derived using the relevant topographical sheets of Survey of India (1 : 50,000 scale as well as 1 : 25,000 scale).

## MPCA data

The herbarium records of plant collections from the 30 Medicinal Plant Conservation Areas (MPCAs) were obtained. These voucher specimen are housed in FRLHT Herbarium and the data are being maintained in computerized form. The MPCA locations, with precise latitude and longitude values are put in the maps in red colour flags to indicate their relevance.

## Distribution maps

The digitization of district and state boundaries, rail and road network as well as streams and water bodies has been done using 1 : 1 million map published by Survey of India. The distribution maps were generated using 'MapInfo Professional v4.0', software. The presence of the species has been shown as 'flags' of three different colours, black, red and blue. Black flags represent the herbarium specimens collected from the 22 herbaria visited during the study. The collections from the MPCA network are shown as red flags. The locations from the

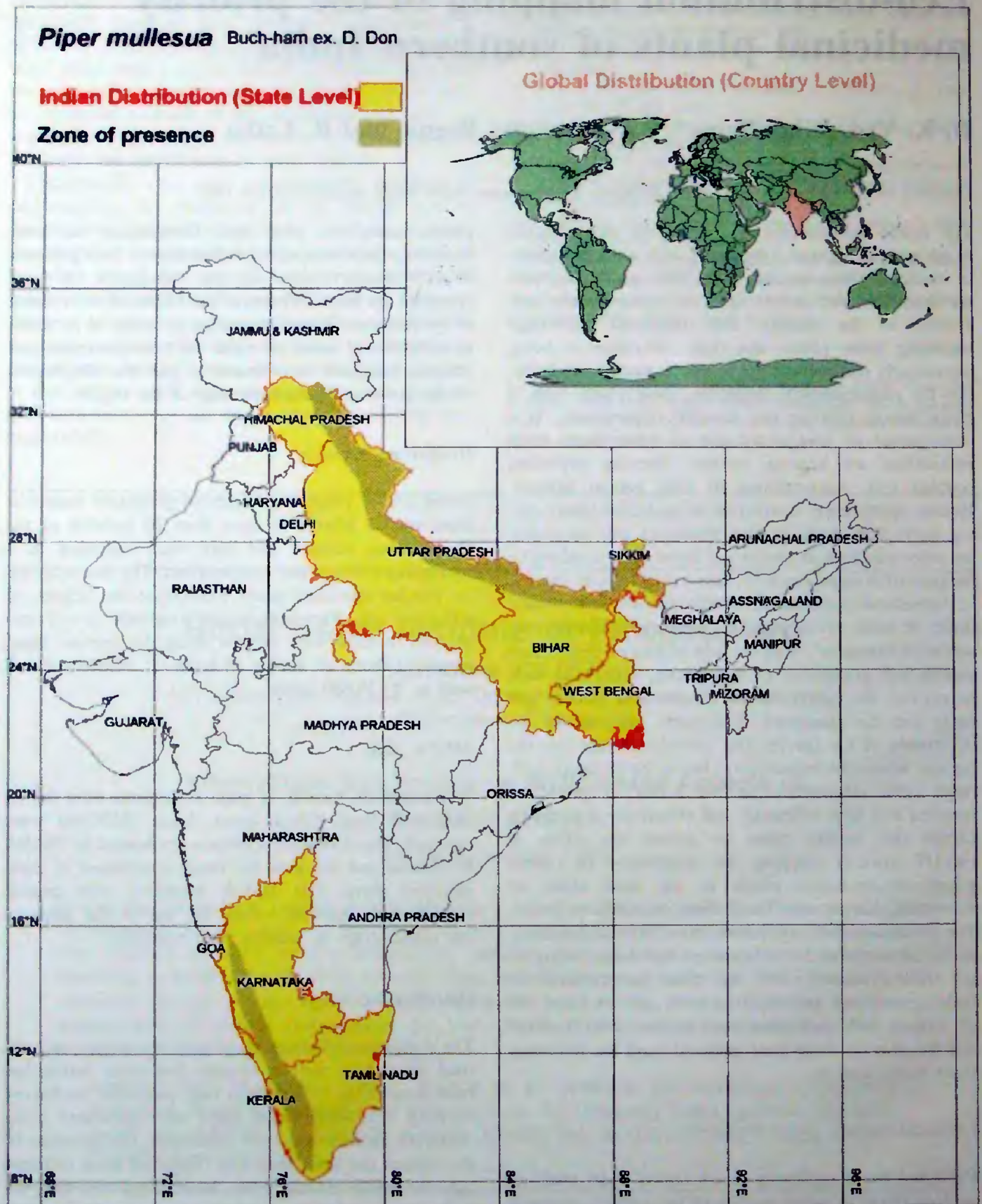*For correspondence. (e-mail: root@frlht.ernet.in)

**Figure 1.** An example of global and Indian distribution map. The state level distribution of *Piper mullesua* is shown within India. The shaded area shows the precise area of occurrence.

**Distribution in Southern India** ( District level - Literature Data )
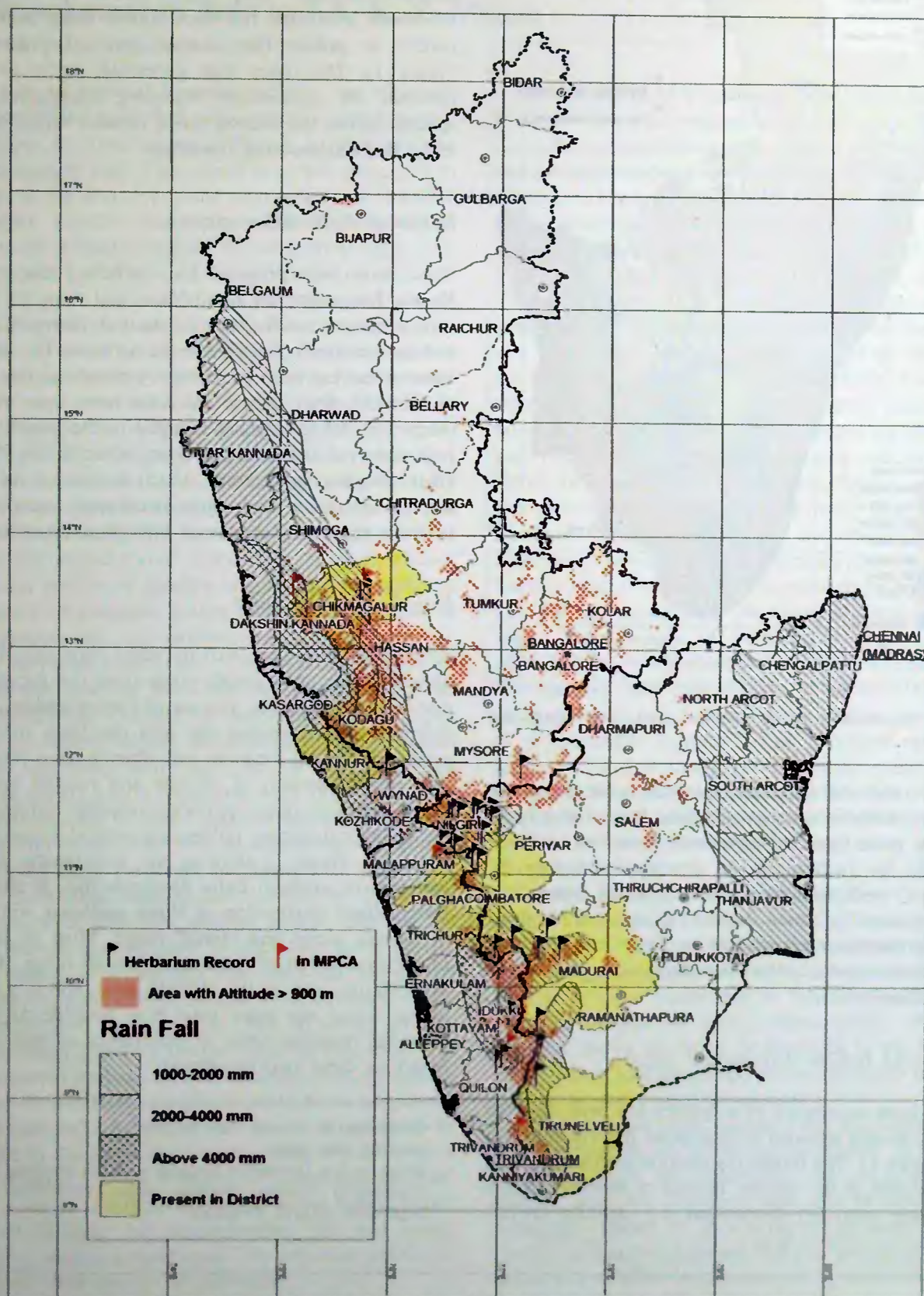
*Piper mullesua* **Buch. - Ham.**

Figure 2. Rainfall (> 1000 mm) and altitude (> 900 m) superimposed with the occurrence of *Piper mullesua*.
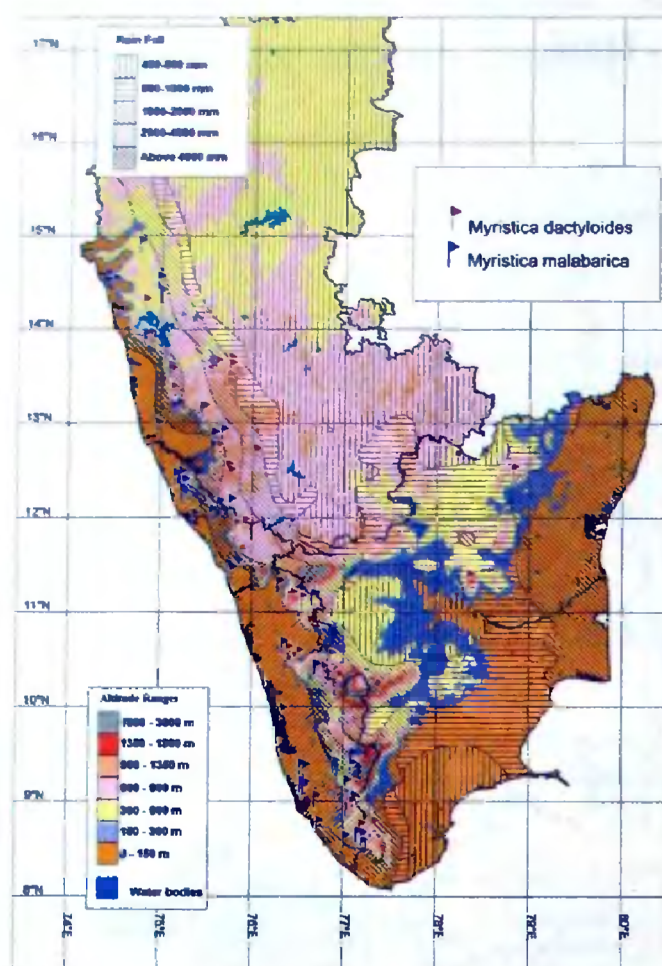
**Figure 3.** Distribution map of *Myristica* species with rainfall and altitude layers.

literature (and the herbarium records without precise collection numbers) are shown as blue flags. Using these databases, three types of maps were generated as given below. So far such maps are developed for over 60 species of medicinal plants. We describe below the general features of these maps. Figures 1 to 3 show three distribution maps relating to *Piper mullesua* and two *Myristica* species (*Myristica dactyloides* and *Myristica malabarica*).

## Global and Indian distribution maps

Country-level occurrence of a species has been depicted in the world map included as inset in the India distribution map (Figure 1). The Indian distribution map shows state level presence of the species. In case of endemic species with highly restricted distribution,, e.g. *Janakia arayal-*

*pathra* and *Pterocarpus santalinus*, we have marked the 'districts' of occurrence in India map. For the Indian distribution map, the data are compiled mainly from the published floras of the respective states. Within the national distribution maps, the precise area of occurrence, whereever available, has been shown using a different pattern or colour (see shaded zone of presence in Figure 1). The maps thus generated, serve as ready reckoner for information regarding distribution of a species within the country (in a broader sense) as well as in the neighbouring countries.

## Regional distribution maps

These have been prepared for southern India covering Kerala, Karnataka and Tamil Nadu, and show the district level occurrence of the species based on literature survey, and the recorded collections in the herbaria. The literature information has been projected by colouring boundaries of districts, from where the taxa have been reported (Figure 2). Of the species mapped in the present study, it is observed that most of them occur in the Western Ghats biogeographic zone, which is one of the major tropical evergreen and moist deciduous forest regions in India exhibiting enormous biological diversity.

## Eco-distribution maps

These have been generated by super-imposing layers of altitude range and rainfall range over the geographical distribution of species. In case of certain species, whose distribution is restricted, the area has been zoomed so as to highlight the locations and other features (Figure 3). The superimposition of altitude and rainfall layers on the distribution maps, provides valuable insights about the ecological factors influencing natural occurrence of a species. Figure 2 showing the distribution of *Piper mullesua* in southern India illustrates this. It shows the geographical distribution of *Piper mullesua* with layers of altitude range and rainfall range. Most of the sites of occurrence fall in the annual rainfall range 1000 mm to 4000 mm and in the altitude zone 900 m a.s.l. and above. Using the same map it is possible to identify even the potential areas of occurrence of this species, based on these two parameters.

1. Ganeshaiah, K. N. and Uma Shaanker, R., *Curr. Sci.*, 1998, **75**, 292–298, (this issue).
2. Report on Eco Distribution Mapping of Indian Medicinal Plants of Conservation Concern (Southern India), 1997–1998, Research Department, FRLHT, Bangalore.